Embedding Cyclic Latin Squares of Prime Power Order In Complete Sets of Orthogonal F-Squares: Low Order Results

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Designs consisting of a subset of the rows of a cyclic latin square, perhaps occurring in permuted order, and having maximal pairwise balance of sets of rows are being examined. These are useful for sequential experiments in which the number of stages cannot be prespecified. A computer algorithm for checking pairwise balance of any subset of a cyclic latin square's rows has been extended to latin squares of orders up to 15, and generalizations are being investigated. On the problem of embedding a cyclic latin square whose order is a power of a prime, orthogonality patterns for low powers of 3, 5, and 7 have been obtained. Extension of these results to the general case by algebraic methods is in progress. The existence of uncompletable sets of orthogonal F-squares is being investigated. Preliminary results on the composition of complete sets of F(4;2,2)-squares have been obtained. Computer programs have been written for generating cyclic latin squares based on an arbitrary permutation of 1,...,n and for checking orthogonality to other cyclic latin squares. These are being applied to finding complete sets of mutually orthogonal squares.